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35p

FREE COMPUTER BUY/SELL SERVICE
COMPUTER SWAP
SEE PAGE 24

We take a peek at the Colour Genie

Vic joystick program converter

Spectrum Rom secrets revealed

More machine code

Cover Story: Asteroids on Spectrum

Win a Jupiter Ace in our Better than Basic competition

POPULAR Computing WEEKLY

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How to submit articles
Articles which are submitted for publication should not be more than 1000 words long

All submissions should be typed and a double space should be left between each line

Programs should whenever possible, be computer printed

At present we cannot guarantee to return every submitted article so please keep a copy

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work

This Week



Cover illustration by Ian Craig

Editorial

Microcomputers have many applications, both serious and not-so-serious However, most people buy microcomputers primarily to play games on them

There is nothing wrong with playing games They can be stimulating, relaxing, even useful Above all they are fun

But, microcomputers are essentially tools They are aids to reasoning that can be put to whatever use we decide

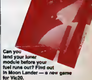
As yet, however, despite a few fanciful schemes about running nuclear power stations from ZX81s, microcomputers have not really been assimilated into our society This is because we are uncertain how microcomputers should be used in industry, commerce and the home

Increasingly, the limits placed on microcomputers are not technical but those of the imagination Quite simply, we have yet to explore the real potential of these machines

What we need is for people who are familiar with microcomputers to look at everyday situations in a new light Why not suggest to your friends and colleagues ways in which microcomputers could make their lives easier?

Next Week





Can you land your lunar module before your fuel runs out? Find out in Moon Lander — a new game for Vic20.

Spectrum gift for Japanese Premier

A ZX Spectrum microcomputer was presented to Mr Zenko Suzuki, the Japanese Premier, by Prime Minister, Mrs Thatcher, during her official visit to the country in September.

The informal presentation took place before a dinner reception held for Mr Suzuki at the British Embassy.

Mrs Thatcher ran a short program drawing the flags of the two countries to demonstrate the machine to the Japanese Premier. A Downing Street spokesman said that Mr Suzuki seemed delighted with the gift, and that "the Spectrum was chosen as an example of recent British high-technology".

The event followed a meeting earlier this year between Clive Sinclair and Mrs Thatcher. Representing Sinclair Research in Japan was John Mathieson of the company's technical staff. He said that the Spectrum was one of three specially constructed for the event and designed to work with the Japanese 60Hz, 525 lines tv network.

Prime Minister Mrs Thatcher

"The presentation had been in the pipeline for about a month but it all happened very quickly. Clive telephoned me two days before and said they wanted somebody to demonstrate the system. I said 'Where? Downing Street'. He said 'No, Tokyo'."

Texas offers £50 refund on TI99-4A

A £50 cash rebate is being offered by Texas Instruments on purchases of its TI99-4A home computer, in an attempt to shore-up its flagging sales in time for the Christmas market.

Buyers of the TI99-4A, at its normal retail price of £199, will be given a form which can be presented to TI for the £50 cash refund.

The scheme will run from October 15 until the end of January. TI will then decide whether to convert the rebate into a firm price reduction.

TI Marketing Manager, Irfan Salem, says that the home computer market has gone very quiet for TI. It has the option of either cutting the price or of advertising heavily in the national press. Having chosen to cut the price, the rebate scheme offered the quickest way of getting the effect through to the customer.

A similar scheme was launched in the United States in August and is reported to have increased sales by a factor of eight.

Irfan Salem believes that the affect of the rebate will be to help bridge the gap between the home computer and the video game market. This will bring the TI99-4A into close competition with the ZX Spectrum and prepare the ground for the expected price reductions on all the Commodore Vic range and the launch of the new Commodore 64.

The 16K Oric 1 will cost £99.95 and will include eight colours and a 240×200 high-resolution display

Oric 1 launch in mid-November

THE much-awaited Oric 1 microcomputer will be launched in mid-November.

Two versions of the machine, a 16K model at £99.95 and a 48K model at £169, will be produced. Both will feature an enhanced form of Microsoft Basic, 8 colours (programmed like the Spectrum as Ink and Paper), 40 × 28 teletext compatible low-resolution screen with full editing and 240 × 200 high-resolution display. Also provided are four voices (three music, one noise) with seven octaves and envelope control, and four pre-programmed sound commands — *Zap, Explode, Shoot* and *Ping*.

The Oric is fitted with an expansion connector, Centronics port and audio and video monitor outputs. A modem, printer and discs are planned. The modem will come first at £59.95, followed by the printer at about £160, both scheduled for Spring 1983.

Oric Products, who will produce the machine, has been formed to combine the design expertise of Tangerine Computer Systems and the financial backing of British Car Auctions.

Tangerine's Paul Kaufman said "The Oric is a competitor for the Spectrum. We are convinced that it is a better machine and we have a lot of big distributors keen to take it on."

Initially it will sell by mail-order and be distributed by Tangerine Computer Systems, Science Park, Cambridge.

Prism to make new software for ZX81

THE ZX81 is having a range of software built for it by Prism Microproducts, its UK wholesaler.

Its hardware, now being sold through video, hi-fi stores and newsagents, is at present accompanied by a selection of 32 Sinclair Research/ICL software cassettes.

This range is to be broadened to include tapes from many leading software producers.

Prism's Managing Director, Bob Denton, said "The market has changed — it is no longer mail-order, it is retail. We have a huge potential number of retail outlets that have never been available to many of the software companies. We have written to everybody who, as far as we know, has produced material for the ZX81, and many have submitted samples to us. Any software passing our quality assessment will be included to augment the Sinclair catalogue," he said.

Mark Eyles of the software company Quicksilva echoed his comments. "Software is no longer a specialist market," he said. "The ZX81 is now a true High Street microcomputer and we get very few cassette mail-orders now. Quicksilva is in contact with Prism. If the ZX81 is to be sold in newsagents then that is where we want our tapes."

ZX81 puts on its snow shoes for Austria

SINCLAIR launched the ZX81 in Austria on September 30. Distribution will be handled by Sinclair's Austrian agent Electronova.

Dr Lagler, head of Electronova, hopes to sell 5,000-10,000 ZX81s by Christmas.

This move follows the success of ZX81 sales elsewhere in Europe. France has sold more than 50,000 ZX81s since October 1981, and West Germany almost as many.

Other countries which now sell the ZX81 include Spain, Italy, Denmark, Belgium, Holland, Switzerland, Norway and Sweden.

Letters

write to Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2

A rosa by any other nama

Elvis Cinclair is pleased to announce his new home computer, the 'Cinclair Rambow' It will sell for £124.99 for the 17K or £174.99 for the 49K version and is designed to replace my ZX18

For the technically minded, it has 257 × 193 hi-res graphics with 39 different colours (30 of which are the same) and can play Beethoven's 9th (with additional music Rom) In about a year or two we will introduce the new 'Cinclair Maxidrive' a very small disc drive designed to look like a big one, and an RS233/network interface board to connect your micro up to three power stations at once

To purchase a Rambow, please send your cheque made out to 'Cinclair Research Ltd' with an SAE to return the money after four months

Elvis Cinclair
Cinclair Research Ltd
[Directors Elvis Cinclair and his Mum]
83 Cornwall Road
Bishopston
Bristol

Constructiva criticism

I would like to air a couple of criticisms that I hope you will find constructive Both refer to *Popular Computing Weekly*, September 9

Re the Editorial "... I just wish the Jupiter Ace was colour instead of black and white " I hope that the micro business has not reached such a level that, as soon as a new micro is brought out, every other manufacturer has to follow suit, with features almost identical to its competitor I rarely use the colour on my Commodore Vic, but just revert to white text on an all-black background

The way that the sentence was written seems to say that the writer of the editorial is now thoroughly fed-up with any computer except those that offer the facilities of colour display

Re 'Jupiter Ace makes Forth bid for stardom' I got fed-up with the way the author seemed to use Basic as the language against which all others are judged — a fear of the unknown? — "????!!! People have the option of writing programs in whichever language they choose, and it is unfair to say that one language has superiority over another They each have their own advantages and disadvantages, so why can't the two exist quite happily side-by-side instead of aiming towards an either/or situation

I am 15 years old and have been programming microcomputers for two years During that time I have learnt to program in Basic, Algol, Pilot, Forth and two machine codes I have even written my own Pilot interpreter for the Commodore Pet There is nothing really difficult about learning another computer language, as long as it is tackled properly So why be afraid of it? 2 5 +' is not at all unnatural once you have read a little on how Forth computes it's arithmetic

Apart from those two points, I consider your mag to be one of the best on the market today (grovel grovel)

PS BRING BACK CITIZEN PAIN!

D Bellchamber
23 Croftlands Avenue
Stubbington
Fareham
Hampshire PO14 2JR

Far from being thoroughly fed-up with black and white micros, I am an avid fan of machines such as the ZX81 and the Acorn Atom.

However, there is no doubt that the vast majority of microcomputer users prefer colour to black and white. Hence the massive interest shown in the Spectrum, Dragon 32 et al

While I was most impressed with the Jupiter Ace, and wish both it and its inventors well, I think it would be a far more commercial proposition if it was a colour machine.

As for Boris Allan's review of the Jupiter Ace, he was comparing Forth with Basic simply because Basic is the language most commonly used by micro enthusiasts As you rightly point out, there are advantages and disadvantages in both languages.

Finally, Citizen Pain. Our readers tended to either love him or hate him. Unfortunately, most of them seemed to hate him.

And now a Dragon!

Dragons are being tamed north of the Border!

Upon capturing my beast and feeding him a diet of the Dragon manual (162 pages), the quick reference guide and an errata sheet, he is still longing for more It is a thankless task, and, unless I can feed him plentiful data about the high-resolution graphics capabilities, he threatens to toast me to a frazzle

So please, please, could you print a listing using *PmODE*, *Point*, *Get*, *Put*, *Pcopy*, *Pclear* etc and try to clarify my predicament

I'm sure that other Dragon tamers are having this problem with their beasts

I must run now, its all go with a Dragon to look after

Paul Richardson
17 Gordon Terrace
Aberdeenshire
Scotland

Our first Dragon program was published in our September 30 issue. Further programs and articles will follow. After all, we have no desire to be toasted to a frazzle either.

Logan's Rom

After Dr Logan's request for Rom bugs in the ZX Spectrum (*Popular Computing Weekly* September 9), I felt I had to respond because I reckon I have found the best one yet To see it in action, simply type in a line number followed by a space or number of spaces and press enter The Spectrum will respond by placing the line number in the listing The program will still run OK, and the lines act like Rems

As an example, try 10 space Enter, and the listing will just say 10

I am sure this is worth a free copy of Ian Logan's new book (hint, hint), ask him what he thinks

W J Day
17 James Watt Avenue
Corby
Northants NN17 1BX

Disappearing tricks

Ian Logan's letter on Spectrum bugs in your September 9 issue was most interesting Your readers may care to investigate a couple of the points he makes with the following simple program

```
10 FOR A = -65530 TO -65540
   STEP -1 PRINT A, INT A.
   NEXT A
```

Use this to find the magic disappearance of the number −65536 and the inability of the loop ever to come to a halt

At the same time, as you continually meet the "scroll?" prompt, try Ian's suggestions for strange responses to this What Ian doesn't actually say is that after one has used some combinations of these responses, the response "n" to the prompt does not operate

Eric Deeson
4 Ethel Road
Harborne
Birmingham
B17 0EL

Reader's request

Within the next few months a large number of primary schools will be ordering (and hopefully receiving) a microcomputer under the Department of Industry Scheme Some teachers may be content to rely solely on professionally produced software, but most, I suspect, will also want to have a go at producing their own programs

As a primary teacher with a BBC micro I would be interested in hearing from anyone who would consider joining a BBC users' group that would suggest, develop and exchange (by post) a) short programs designed for children aged 5-11, together with b) notes on how the programs, and others that become available for the BBC micro, might be best used and adapted

Please send a SAE — along with any ideas you might have for such a Users' Group — to me

J Sheard
31 Glen Court
Avenue Road
Wolverhampton
West Midlands WV3 9JW

If you have an opinion you want to express, or have spotted an error that needs correcting, write to Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2



Asteroids

A new game for 16K Spectrum

by Antony Ascroft

This is a game in which you have to dodge rocks which come towards you. The game starts with a pause (in which the computer sets up the characters needed in the game). It then asks for your name and the required level of difficulty.

Asteroids start at the bottom of the screen and work their way to the top. Your aim is to dodge the rocks and collect as many points as possible. You move the ship by the keys 5 (left) and 8 (right). To fire press 0.

When you fire, a missile goes down the screen five rows. If it hits an asteroid it blows up. Shooting a spaceship gives you an extra 25 points. But, watch out for debris.

If you get past a batch of 100 asteroids then you get another missile — you only have 10 to start with. But you also move down the screen one row, which makes the game harder as it progresses.

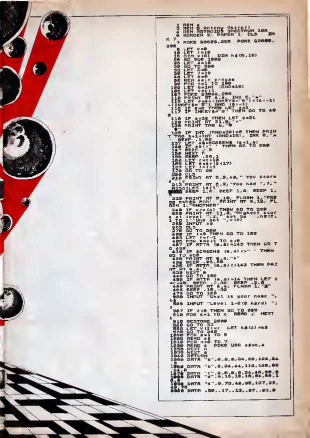
When you finally collide with an asteroid you are given your score and the highest score on that level.

There are several sub-routines which are listed below.

5-40	Sets variables and colour
100-170	Main part of program
210-265	When the game is over
400-470	Missile launch
500-560	Start of game
1000-1040	Creates the characters
1050-1090	Data for characters.
2000	Data for different levels

Remember when you first put the program in that the characters have not yet been formed. So put the computer into graphic mode and then press the relevant key.

In line 110 the symbol is graphic A
In line 130 the symbol is graphic B
In line 135 the symbol is graphic C
In line 420 the symbol is graphic D
In line 460 the symbol is graphic E



```
   1 REM a
   3 REM © Antony Ascroft
   4 REM ASTROIDS SPECTRUM 16K
   6 BORDER 2: PAPER 1: CLS : IN
K 7
   7 POKE 23609,255: POKE 23608,
200
   8 LET v=0
  10 LET f=10
  15 DIM v(6): DIM h$(5,10)
  20 GO SUB 1000
  25 LET a=10
  30 GO TO 500
  33 LET C=0
  35 LET f=10
  40 LET e=0
  80 REM main progam
  90 FOR n=1 TO 100
 100 LET b=INT (RND*10)
 105 LET c=c+1
 107 POKE 23692,205
 110 PRINT AT e,a, INK 6,"a"
 115 LET a=a+(INKEY$="8")+(a<-1)
-(INKEY$="5") AND (a>-1)
 116 IF a=0 THEN LET a=1
 117 IF INKEY$="0" THEN GO TO 40
0
 118 IF a=32 THEN LET a=31
 120 PRINT AT 21,0,"+"
 130 PRINT TAB b,"
e"
 135 IF INT (RND*30)=0 THEN PRIN
T TAB b+1+INT (RND*15), INK 6,"a
": BEEP .1,60
 137 LET a$=SCREEN$ (e+1,a)
 140 IF a$<>" " THEN GO TO 200
 147 BEEP 1,0
 150 NEXT n
 155 BEEP .20,1
 160 LET c=c+10
 165 LET e=e+(e<17)
 167 LET f=f+1
 170 GO TO 90
 200 CLS
 210 PRINT AT 0,2,b$," You score
d ";c
 215 PRINT AT 6,2,"You had ",f,"
MISSILES left"
[redacted] BEEP 1,6: BEEP 1,0: BEEP 1,
5
 230 PRINT AT 8,10, FLASH 1,"PRE
SS ENTER FOR": PRINT AT 9,12, FL
ASH 1,"ANOTHER"
 240 IF c>v(z) THEN GO TO 550
 250 PRINT AT 11,0,"Highest scor
e at level ",z," was by ",h$(z,
1 TO )''Who got ",v(z)
 260 INPUT a$
 265 CLS
 270 GO TO 500
 400 IF f=0 THEN GO TO 150
 403 LET f=f-1
 405 FOR m=e+1 TO e+6
 407 IF ATTR (m,a)=143 THEN GO T
O 420
 410 IF SCREEN$ (m,a)<>" " THEN
GO TO 450
 420 PRINT AT m,a,"+"
 422 BEEP .05,60
 425 IF ATTR (m,a)<>143 THEN PRI
NT AT m,a," "
 430 NEXT m
 440 GO TO 100
 450 IF ATTR (m,a)=14 THEN LET c
=c+20: BEEP .2,30: BEEP .2,0
 460 PRINT AT m,a, FLASH 1,"*"
 465 BEEP .15,-30
 470 GO TO 100
 500 INPUT "What is your name ",
b$
 505 INPUT "Level 1-6(6 hard) ";
z
 507 IF z>6 THEN GO TO 505
 510 FOR k=1 TO z: READ j: NEXT
k
 518 RESTORE 2000
 520 GO TO 33
 550 LET v(z)=c: LET h$(z)=b$
 560 GO TO 240
1000 FOR a=1 TO 5
1005 READ a$
1010 FOR n=0 TO 7
1020 READ a: POKE USR a$+n,a
1030 NEXT n
1035 NEXT a
1040 RETURN
1050 DATA "a",0,0,0,24,60,126,24
,0
1060 DATA "b",0,24,44,110,126,60
,24,0
1070 DATA "c",0,0,0,0,54,40,60,0
1080 DATA "d",0,16,16,16,84,60,1
6,0
1090 DATA "e",0,73,42,85,137,28,
42,73
2000 DATA .20,.17,.13,.07,.03,0
```

The two faces of Nigel Searle

***David Kelly** talks to the head of Sinclair's computer division.*

Nigel Searle studied mathematics and computer science at Lancaster University and then did a PhD in artificial intelligence at Edinburgh. For the past 10 years he has been involved in one way or another with the Sinclair companies.

Originally, he worked on the design of the Sinclair scientific and programmable calculators. Then he ran the company's American office in Boston for two years. In March this year he retunted to the UK as head of the computer division of Sinclair Research, responsible for all activities in the company relating to computers.

One of his first achievements was to persuade the Department of Industry to include Sinclair's Spectrum in the government's £8m "Micros in Primaries" scheme. The ZX81 was a notable absentee from the government's earlier scheme to put a micro in every secondary school.

"Just after I got back to the UK, before the Spectrum was announced in April, I heard rumours that the Department of Industry was going to announce a Primary Schools Scheme this summer," explains Searle. "We asked to show them our new computer. When we approached them they had actually made their choice of machines for the scheme but they agreed that the Spectrum was suitable and decided to include it."

Searle also recognised the potential inherent in Prestel for micro users. A Prestel adaptor for the Spectrum should be launched early in the new year.

"Prestel is a great opportunity with a tremendous capacity, but has so few users," says Searle. "It isn't making headway because it is too expensive and difficult to use, but you have to consider not what benefit people get from it now but what they will get in the future. Kids will do more of their learning from computers and many people will work from home.

"As far as Sinclair is concerned, all these things mean that we shall be becoming more and more involved in writing and marketing software as a matter of strategy.

"The computers we are designing are becoming ever more complex and will be of little use without the software to run on them. The ZX81 is a learning machine. The Spectrum, with microdrives, is altogether different. Somebody is going to produce the software to go with it and it might as well be us!

"The profits to be made on software are high. The value of the product is its content, rather than the cost of the tape and container. It is obviously attractive for us to get into that. Besides, it is going to be increasingly difficult to make money out of the hardware. Already the business is becoming very cut-throat with so many new machines.

"In the past we have always sold our computers mail-order, but the market place is changing. We would not want to stand by and not give people the chance of choosing a Sinclair.

Nigel Searle – opening up new markets.

"We had an exclusive arrangement with W H Smith and there was a time when this was advantageous. But it did seem that many retailers were starting to sell microcomputers and we had to take advantage of that so we are now retailing the ZX81 through wholesalers, Phsm Microproducts.

"We will retail the Spectrum sooner than we did the ZX81 because of the changing market. Besides it will be easier to sell the Spectrum through those outlets already selling the ZX81 than it was to set these outlets up in the first place.

"Our machines are now being sold in the United States under the Timex banner. All the indications are that they are going to be extremely successful. Timex now have the largest share of the US market within six weeks of beginning to sell the Sinclair Timex 1000 and it seems very likely that they will become the dominant computer manufacturer.

"I would expect them to market a Spectrum-like product over there sooner rather than later. Their objective is to get in phase with us. We have the technology and, if it is worth having, then it is worth having as soon as possible. I am sure that soon they will be selling products in the American market as soon as we can develop them.

"Sinclair Research is changing. It has always been a technology driven company with no great emphasis laid on exploiting the market. We will now sell not just by the most profitable route but by any route that is *sufficiently* profitable.

"As far as Spectrum deliveries are concerned I recognise that the customers are not satisfied. We have tried to respond with letters to those who have ordered the machines but it is very difficult.

"The scary thing about it was not simply that we weren't producing enough machines, but that we didn't seem able to control the numbers we produced even with relatively small numbers. We have not been able to predict with confidence how many we would produce in a week. This is what our customers could not accept — that we were just unable to tell them when they would get their machines.

"We can now do this. Production, while still not as high as we would like, is now smooth and regular, a far cry from three weeks ago. We'd be running along nicely producing *X* hundred a day and then suddenly we'd hit a problem. We have had difficulties with new suppliers and there have been design problems.

"On a day when we might have hoped to make 400 Spectrums we might have made only 40. The Ram expansion unit was the main problem and we are only now getting back to the sort of production levels we were at before Timex went on their annual three-week holiday in July.

"When they came back from holiday we all had high hopes. The Ram expansion board had been causing assembly problems, so we designed a new main printed-circuit board incorporating the Ram expansion. But the tracking on the new board was very fine and the tolerence of the whole job went down. In retrospect we might have been better advised to have stuck with the original boards.

"We of course have to accept responsibility for this — after all we got ourselves into the problem. But the customers didn't seem to understand that we didn't *know* when they would get their machines.

"I suppose I would have felt as they did if I had ordered one. I accept our mistake in having a product that could not be reliably produced. It may not seem so —



Remembering recent problems.

but we have spent an absolute fortune in customer service in the last few months — far, far more, I assure you, than any interest accruing from the money orders we have received.

"Now that there are signs that the production of the Spectrum is increasing we can begin to think of new projects.

"Our design department has never been so strong. We obviously intend to go on producing new computer products. We have no plans to launch a new printer immediately but we shall be producing the microdrives for the Spectrum very early in the new year.

Machine Code

Ian Stewart and Robin Jones present a new series for beginners

Calling all branches

So far, our instruction set looks a bit thin We have *Ld* and *St* which will move things around memory, *Add*, which is pretty primitive arithmetic, and *Hlt* to stop the program

We can pep up the arithmetic capability a bit by adding *Sub* which will subtract the contents of a location from the A-register But, there are no instructions for multiplication division or the calculation of square roots

What we really need is a set of branch instructions equivalent to Basic's *If … Then*

It is fairly easy to branch to an instruction out of the usual sequence all you need to do is change the contents of the PC register So we'll use an instruction like

```
JP416          [jump to 416]
```

Whenever it is executed it will put 416 in the PC The system is "fooled into thinking that the next instruction is in 416 Then it will go on to 417, 418 etc, until the next 'jump' instruction is encountered Of course, any address can follow the Jp opcode

This instruction is more like a *Goto* than an *If … Then …* statement What we need is an instruction which resets the PC only if some condition is met. The simplest test we can make is whether the A-register contains zero

```
JPZ 2A7        [jump to 2A7 only if A-reg. contains 0]
```

Another would be

```
JPN 14E        [jump to 14E only if contents of A-reg
                are negative]
```

That is the minimum we can get away with because we can now test for a positive (non-zero) number by noticing when the program doesn't jump on either *Jpz* or *Jpn* instructions

Subroutines and Stacks

While on the subject of transferring control from one place to another inside the program how about something like Basic's *Gosub* and *Return*?

We'll have an instruction

```
CALL 205       [call the subroutine starting in 205]
```

which puts 205 into the PC just like a *Jp* opcode But *Call* also performs a second function — it stores the address of the instruction after the *Call* so that when a "return' (opcode *Ret*) is encountered it can load the stored address back into the PC to continue the main program where it left off

This is where the SP register comes in We use some of the memory as a *stack* (remember stacks?) and SP points to the top of the stack When a *Call* is obeyed the return address (the address of the *Call* + 1) is pushed on to the stack When the *Ret* is encountered the stack is popped into the PC Here's an example

PC 3B9 → CALL 3BC (3B9)
SP 3FF → 3FF

Memory	Address
CALL 3BC	3B9
	3BA
	3BB
	3BC
	3BD
RET	3BE
	3FD
	3FE
	3FF

3BC–3BE ← subroutine

The CALL is about to be obeyed

PC 3BC → 3BC
SP 3FE → 3FE

Memory	Address
CALL 3BC	3B9
	3BA
	3BB
	3BC
	3BD
RET	3BE
	3FD
	3FE
3BA	3FF

3BC–3BE ← subroutine

Now it has been, and the return address is on the stack The program steps through the subroutine until it reaches the RET after which

PC 3BA → 3BA
SP 3FF → 3FF

Memory	Address
CALL 3BC	3B9
	3BA
	3BB
	3BC
	3BD
RET	3BE
	3FD
	3FE
3BA	3FF

3BC–3BE ← subroutine

and control is back inside the main program

Reproduced from *Machine Code and better Basic*, by Ian Stewart and Robin Jones (price £7 50), by kind permission of Shiva Publishing Ltd, 4 Church Lane, Nantwich, Cheshire CW5 5RQ.

If you have any machine code subroutines/tips/games, please send them to: Machine Code, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.



Inside view of the Colour Genie showing the large printed-circuit board and, at left, the transformer and associated power supply.

Colour Genie upholds evolutionary theory

***David Kelly** finds that his wish is not always the Colour Genie's command*

The Colour Genie is the natural successor to the Video Genie. Manufactured by EACA International in Hong Kong and imported by Lowe Electronics, the Colour Genie costs £199.

Like its EACA predecessors, the Colour Genie is based around the Z80 chip. It has 16K Rom and 16K Ram, nine colours, three sound channels and runs a version of Extended Microsoft Basic.

The first thing that strikes you about the Colour Genie is the large size of its box. Inside is the machine itself, two booklets, cassette and tv leads, and a demonstration tape.

The thinner of the two booklets is an introductory manual telling you what to plug where and how to build up simple programs. It is co-authored by Robin Bradbeer who wrote similar notes for the Spectrum. The second booklet is a more detailed technical description of the micro's capabilities.

The introductory manual opens with "Congratulations on purchasing a Colour Genie microcomputer. You are now the proud owner of one of the most sophisticated personal computers available. Take the computer out of the box carefully and attach an appropriate plug to the mains lead." Unfortunately you will not be able to find out just how sophisticated the Genie is if you have not already bought a plug.

Hardware

Removed from its protective foam packaging and set down on the dining room table the Colour Genie looms large. It is almost 1½ feet wide and 1 foot deep. The case consists of dark-brown and white plastic and is rather unimaginative.

The sense of parallel grooves running up the right-hand side of the keyboard, incorporating the loudspeaker grill, are fictitious rather than functional — there is no speaker underneath. The machine's audio output is through the tv.

The keypad is a full-size, well laid out, Qwerty board. The Break key is well away from the Return key and there is a full-length space bar. The two interlocking *Reset* keys are a good idea — both must be pressed simultaneously before the system resets. It is a pity that *, = and + are all shifted symbols. The keyboard is angled in a similar way to the Commodore machines so that the 64 preprogrammed graphics characters can be displayed on the front of the keys. They are selected in conjunction with the *Control* function.

Unshifted letters are capitals. To get the lower-case letters the Shift key is used. The feel of the keys was not wholly to my liking — they depressed too far and were rather springy.

On the right of the keyboard are the four function keys. To the left is a neon light to indicate if the machine is connected. There is an on off switch at the back.

Also at the back are the tv output, Rom cartridge port, cassette input/output and monitor audio and video outputs. These latter outputs are useful but the choice of phono for the video output is unusual. The parallel and serial input/output ports and light-pen port are located on the right hand side. The cassette, serial and light-pen sockets are all sensibly Din.

Before considering what the Colour Genie does with this hardware let us briefly look inside. The keyboard and top of the casing hinges away from the back. The transformer and associated power supply is on the left. Almost the whole of the Genie's circuitry is contained on one large printed-circuit board, which accounts for the bulky casing. There is a fair amount of excess space inside the machine — rather like the Dragon.

There are over 60 chips on the board including the Z80 processor, display chip and sound chip. Also on the board, at the power supply end, is the Pal colour UHF modulator. The pcb appears well constructed and the tracks on the board are reasonably solid.

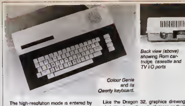
Most new microcomputers these days have an external power supply to avoid possible overheating. Although the Colour Genie has an integral power supply it has an adequately heat-sink and, even after prolonged use, I could detect no such problem.

Software

The Colour Genie runs its own version of the now increasingly popular extended Microsoft Basic.

In the standard low-resolution graphics mode there are 24 rows and 40 columns. Information is directed onto the screen using the *Print @ n, "X"* command. X is the letter or figure to be printed and *n* can be any number between 1 and 960, corresponding to the 960 possible screen positions. (For example, if *n* is 40 this denotes the first character on the second line.) This is different from some other machines where both the row and column have to be specified.

The low-resolution mode can define up to nine colours — black, white, green, red, yellow, orange, blue, cyan and magenta. These are formatted using *Colour N*, where *N* is 0 to 8.



Back view (above) showing Rom cartridge cassette and TV I/O ports

Colour Genie and its Qwerty keyboard.

The high-resolution mode is entered by depressing the *Control* and *Mode Select* keys simultaneously Low-resolution is restored by pressing the keys again

Alternatively, high-resolution mode can be called during a program using the command *Fgr* Low-resolution is restored using the command *Lgr*

All programming is carried out in the *Lgr* mode When a program involving high-resolution graphics is run the other mode has to be switched in and out using the *Fgr* and *Lgr* commands The cursor line is not visible in *Fgr* mode

The high-resolution page is 160 × 80 and can be defined in four colours — black blue, red and green These are formatted by *Fcolor N* where *N* is 1 to 4

In the high-resolution mode there are several useful commands *Plot X1,Y1 to X2,Y2* draws a line between two points *Circle X,Y,R* draws a circle centre at *X,Y* and radius *R* *Shape X,Y* draws a figure beginning at *X,Y* defined by the user with individual bytes determining up, down left right and the colours *Paint X,Y,C B* colours in a close contour starting at *X Y* with the colour *C*, leaving the boundary of the painting area in the colour *B*

Like the Dragon 32, graphics drawing and plotting is quick — much more so than the Spectrum

A strange quirk of the machine I reviewed (and this may not be true of the production models) gave it a mid-Atlantic flavour the low-resolution colour command is *Colour* while the high-resolution one is *Fcolor*, without the *u* Another peculiarity is that the low-resolution mode uses a single number to define a point on the screen while the high-resolution mode uses *X Y* co-ordinates

The Colour Genie has some very sophisticated editing commands These are used in conjunction with the four function keys and the cursor keys

The function keys operate as four single-keyword entry keys to simplify editing When depressed they give *List*, *Run*, *Auto* and *Edit* The *Auto* key instructs the computer to write a new line number immediately after the return key is pressed

The cursor keys ← and ↓ are straightforward moving the cursor one space to the left — used as the delet key — and one line down ↑ comes up on the screen as [and is the exponential key — it has nothing to do with the cursor → moves the cursor, not one space to the right but to the start of the next screen field or *Tad* location This is sensible otherwise it would merely be a duplication of the space-bar

A special feature of the Colour Genie allows the character, size and frequency of blinking of the cursor to be redefined to the user's preference

The editing sequence is built around a set of operating key letters which can be used to change the existing text First type in *Edit X*, where *X* is the line number of the line you wish to change The computer enters the edit mode and the line to be changed is selected. Typing *L* brings the line down and displays it with the flashing cursor at its start

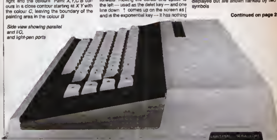
Move the cursor along the line, using the space-bar or cursor keys, until the section to be changed is reached At this point any number of edit-mode sub-commands can be applied

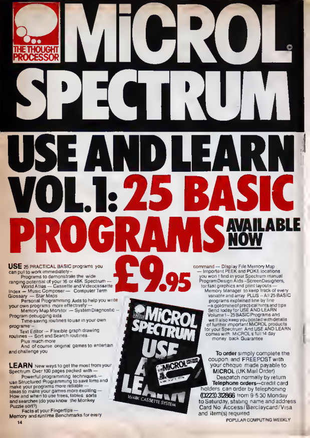
Each of these sub-command letters is followed by the relevant correction to the text The *C* key followed by an entry changes the character immediately after the cursor The *I* key followed by an entry inserts a new character immediately after the one on which the cursor rests The *D* key deletes the character after the cursor

To aid editing, the character is only deleted when the changes are saved and the command mode is reinstated During editing the deleted characters are still displayed but are shown flanked by two I symbols

Continued on page 22

Side view showing parallel and I/O, and light-pen ports




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How to contribute

Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.

The author of that program will qualify for DOUBLE the usual fee we pay for published programs
(The usual fee is £10.)

Presentation hints

Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.

The program will be well documented, the documentation being typed with a double spacing between each line.

The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.

Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing.

Please enclose a stamped, self-addressed envelope

Logic Circuit

on Spectrum

The program enables you to plot out a logic circuit on the screen using numerous facilities to aid you. All the logic circuit symbols are user defined, these symbols are for *And*, *Or*, *Not*, *Nand* and *Nor*.

The program does not have to be used for plotting logic circuits, as it could be used as a "sketch pad".

The programs facilities are:

Move cursor slow or fast.
Plot in any colour
Use logic symbols.
Save the screen display on tape
Load a screen display from tape
Draw a line from A to B.
Draw a circle with centre at cursor and input radius
Clear screen
Help

Full instructions are included in the program

```
   8 REM  LOGIC CIRCUIT PLOTTER
   9 REM  © ANDREW FILBY 1982
  10 GO SUB 9000
  15 GO TO 5000
  20 LET FL=0: LET k=0: LET l=10
0: LET p=0
  30 PRINT AT 0,0;"LOGIC CIRCUIT
 PLOTTER";AT 0,0; OVER 1;"_____"
  40 PRINT "S=NAND=>",CHR$ 0; OV
ER 1;"  U=NOR=>",CHR$ 0; OVE
R 1;"   N=NOT=>   A=AND=
0;"  O=OR=>     PRINT OVER 1;AT 2
0;"   ";AT 21,0;"NOT PRINTING"
  45 PRINT AT 20,0;"_____"
  50 PLOT k,l
  60 PRINT AT 21,18; INK 0;"POSI
TION=";k;",";l
 100 LET a$=INKEY$: IF a$="" THE
N GO TO 60
 104 IF a$="K" OR a$="k" THEN IN
PUT "Input name of picture.", LI
NE n$: PRINT AT 21,0;"
    ";AT 2,0;"
                 ";AT 0,0;n$: LOAD n$
SCREEN$
 105 IF p=0 THEN PLOT OVER 1;k,l
 106 IF a$="p" OR a$="P" THEN BE
EP .04,60: LET p=NOT p: PRINT AT
 21,0;("PRINTING"    AND p=1)+(
NOT PRINTING" AND p=0)
 107 IF a$="s" OR a$="S" THEN PR
INT AT 21,0;"Input name of pictu
re"          : INPUT "(10 chara
cters max)", LINE n$: PRINT AT 2
1,0;"                         ";AT
 0,0;"
    ";AT 0,10;n$: FOR a=10 TO
LEN n$: PRINT AT 0,a; OVER 1;"_
": NEXT a: SAVE n$SCREEN$
 108 IF a$="l" OR a$="L" THEN CL
S : GO TO 30
 109 IF a$="1" OR a$="2" OR a$=
"0" OR a$="3" OR a$="4" OR a$="5"
 OR a$="6" OR a$="7" THEN INK VA
L a$: BORDER VAL a$: BEEP .01,30
 110 IF (a$="u" OR a$="U") AND l
<161 THEN LET l=l+1
 120 IF (a$="v" OR a$="Y") AND l
>10 THEN LET l=l-1
 130 IF (a$="i" OR a$="I") AND k
<254 THEN LET k=k+1
 140 IF (a$="t" OR a$="T") AND k
>1 THEN LET k=k-1
 150 IF a$="a" OR a$="A" THEN PR
INT AT (175-l)/8.33333,k/8;"▶"
 160 IF a$="o" OR a$="O" THEN PR
INT AT (175-l)/8.33333,k/8;">"
 170 IF a$="n" OR a$="N" THEN PR
INT AT (175-l)/8.33333,k/8;"▶"
 180 IF a$="s" OR a$="S" THEN PR
INT AT (175-l)/8.33333,k/8;"▶";
OVER 1;CHR$ 8;"."
 190 IF a$="u" OR a$="U" THEN PR
INT AT (175-l)/8.33333,k/8;">";
OVER 1;CHR$ 8;"."
 191 IF CODE a$=52 AND k>8 THEN
LET k=k-8
 192 IF CODE a$=178 AND k<240 TH
EN LET k=k+8
 193 IF CODE a$=187 AND l<160 TH
EN LET l=l+8
 194 IF CODE a$=180 AND l>20 THE
N LET l=l-8
 195 IF a$="h" OR a$="H" THEN GO
TO 5000
 196 IF a$="c" OR a$="C" THEN IN
PUT "Input name of picture.", LI
NE n$: PRINT AT 9,0;"
                    ";AT 21,0;"
             ";AT 9,0;n$: COPY
 197 IF a$="d" OR a$="D" THEN BE
EP .05,50: GO SUB 8000
 198 IF a$="E" OR a$="e" THEN ST
OP
 200 IF a$="z" OR a$="Z" THEN IN
PUT "Input radius of circle ";r:
 IF k-r>0 AND k+r<255 AND l-r>
10 AND l+r<160 THEN CIRCLE k,l
,r
 300 GO TO 60
5000 REM INSTRUCTIONS-© A.FILBY
5004 PAPER 1: INK 7: BORDER 1: C
LS
5010 PRINT AT 0,3;"Instructions-
©-Andrew Filby";AT 0,3; OVER 1;
5020 PRINT '"To move the cursor(
a pixel)";AT 2,9; OVER 1;"_____"
5030 PRINT '"T=left  Y=down  U=u
p  I=right"
5035 PRINT '"For extra speed
hold SYMBOL SHIFT down aswell."
5040 PRINT '"COLOURS";AT 8,0; OV
ER 1;"_______"
5050 PRINT '"1=blue,2=red,3=mage
nta,4=green  5=cyan 6=yellow 7=w
hite 0=black"
5060 PRINT '"Symbols";AT 15,0; O
VER 1;"_______"
5070 PRINT '"A=AND=>   N=NOT=>
O=OR=>     S=NAND=>",CHR$ 8
0; OVER 1;"."  U=NOR=>",CHR$ 8
; OVER 1;"."
5080 PRINT '"PRINTING";AT 18,0;
OVER 1;"________"
5090 PRINT '"P=Print ON/OFF  L=
clear screen"
5100 PRINT AT 21,5; FLASH 1;"Pre
ss any key to continue.": BEEP .
02,(RND*100)-40: IF INKEY$="" TH
EN GO TO 5100
5110 CLS
5111 PRINT "SAVING AND LOADING
";AT 0,0; OVER 1;"__________________"
5120 PRINT '"S=SAVE PICTURE, K=
LOAD PICTURE"
5130 PRINT '"DRAW LINE";AT 6,0;
OVER 1;"_________"
5135 PRINT '"POSITION CURSOR AT
START OF LINE THEN PRESS  D ,POS
ITION CURSOR AT END OF LINE THEN
 PRESS  D  AGAIN AND THE LINE
WILL BE DRAWN"
5140 PRINT '"THE CURSOR POSITION
 WILL BE DISPLAYED AT ALL
TIMES FOR SCREEN MAPPING."
5145 PRINT '"Draw circle";AT 17,
0; OVER 1;"___________"
5151 PRINT '"Position cursor at c
entre,then press  Z  and input
radius."
5152 PRINT '"             E = END"
5155 PRINT AT 21,0; FLASH 1;"Pre
ss any key to continue.": BEEP .
08,(RND*100)-40: IF INKEY$="" TH
EN GO TO 5155
5190 INK 0: BORDER 8: PAPER 7: C
LS : GO TO 20
8000 IF FL=0 THEN LET K1=K: LET
L1=L
8010 IF FL=1 THEN DRAW K1-K,L1-L
: LET FL=0: BEEP .03,20: RETURN
8020 LET FL=NOT FL
8030 PLOT K,L
8100 RETURN
8999 STOP
9000 FOR f=144 TO 147: FOR a=0 T
O 7: READ z: POKE USR CHR$ f+a,z
: NEXT a: NEXT f
9010 RETURN
9100 DATA 0,0,0,BIN 00000111,BIN
 00000111,BIN 00000111,0,0
9110 DATA 0,BIN 01000000,BIN 011
00000,BIN 01110111,BIN 01111111,
BIN 01110111,BIN 01100000,BIN 01
000000
9120 DATA 0,BIN 11000000,BIN 011
00000,BIN 00110000,BIN 00111000,
BIN 00110000,BIN 01100000,BIN 11
000000
9130 DATA 0,BIN 11000000,BIN 111
00000,BIN 11110000,BIN 11111000,
BIN 11110000,BIN 11100000,BIN 11
000000
```

Logic Circuit
by Andrew Filby

40 Charactar Print

on Spectrum

This machine code program enables anyone with a 48K Spectrum to print on a 40-column line. The program merits a lengthy explanation. Suffice to say it dis-ects the character and plots it onto the screen using the *Rom's Plot* routine. Each character is 6 pixels wide, rather than the normal 8 — so it requires a new character set. It is a good idea if you define your own on a 6 × 6 grid, leaving a space round the right and bottom to separate the characters. To save you having to do this until you have seen the program work, program 1 moves the old character set up into Ram, trying to make it more suitable by

moving the "bits" of character one position left. Program 2 loads in the machine code.
To print a 6 × 8 character

```
1 POKE 64000,a REM ASCII code of character
2 POKE 64001 b REM the column times 8
3 POKE 64002 c REM 175-8 times line
4 RANDOMIZE USR 63000
```

It is also possible to print over the lines or set other widths for the characters by changing 'b' in line 2 to "column times 'n'" and Poke 63016 'n' ('n = 1 to 8). To make the ROM's PRINT use the new character set, POKE 23606 224 POKE 23607 250

Program 1

```
10 CLEAR 62999
20 FOR X=256 TO 1144
30 LET A=PEEK (15360+X)
40 IF A>127 THEN LET A=A-128
50 POKE 64224+X,A+2
60 NEXT X
```

Program 2

```
10 CLEAR 62999
20 FOR X=63000 TO 63060
30 READ A
40 POKE X,A
50 NEXT X
60 DATA 38 0 58 0 250 111 41 41 41,17,224,250,25
   6,6 14 8 96 203 34 220 80,248 13 0 0 0
   32,245 35,0 0 0 16 236,201
70 DATA 245 197 213 229 42 1 250 62 6 145
   133 79 120 130 71 205,220 34,225,209 193,
   241 201 201,201
```

```
  LD H,0
  LD A (64000)
  LD L,A
  ADD HL,HL
  ADD HL,HL
  ADD HL,HL
  LD DE 64224
  ADD HL DE

  LD B,8
a LD C 8
  LD D (HL)
b SLA D
  CALL C,63030
  DEC C
  JR NZ b
  INC HL
  DJNZ a
  RET

  PUSH AF
  PUSH BC
  PUSH DE
  PUSH HL

  LD HL,(64001)
  LD A,6
  SUB C
  ADD A,L
  LD C A
  LD A,8
  ADD A,H
  LD B A
  CALL 8933 ROM's PLOT

  POP HL
  POP DE
  POP BC
  POP AF
  RET
```

by Paul Hampshire

Hex to Decimal

on Vic20

This program will probably be of most use to beginners. It will convert Hex to decimal. This is how it works.

Program notes

- 5 Power to convert Hex to decimal.
- 10 First Hex number to be converted to decimal
- 11 If the input is nothing than re-Run program.
- 20 Put Hex number into A$
- 30 Last to first character of Hex number
- 35 Add one to power to convert Hex to decimal
- 36 If current character zero than goto line 40 because zero=ASC 0
- 37 If current characters ASC value is 0 then go and convert it to number. N.B. If character is not number or is '0' ASC value=0. That is why line 36 is needed
- 40 Converts current character in to decimal.
- 45 Add value of current character to decimal number so far
- 50 Next character
- 60 Print result
- 70 Re-Run program.
- 100 Put current characters in to B$
- 110 If B$ not letter between A and F then says it is illegal
- 120 Converts letter to number
- 130 Returns to loop

```
5 D=-1
10 INPUT"HEX";HN$
11 IF HN$=""THENRUN
20 A$=HN$
30 FOR A=LEN(A$) TO 1 STEP-1
35 D=D+1
36 IF MID$(A$,A,1)="0" THEN 40
37 IF VAL(MID$(A$,A,1))=0 THEN 100
40 B=VAL(MID$(A$,A,1))*(16^D)
45 C=C+B
50 NEXT
60 PRINT"DECIMAL"C"=HEX"HN$
70 RUN
100 B$=MID$(A$,A,1)
110 IF ASC(B$)<48 OR ASC(B$)>70
THEN PRINT"ILLEGAL HEX NUMBER":RUN
120 B=ASC(B$)-55
130 GOTO 45
```

Hex to Decimal
by Matthew Saxon

Mini-maze

on Vic20

The player must move through a randomly generated maze to a star at the top of the screen in the shortest possible time. However he may only move upwards and sideways — not backwards. If he crashes he receives five penalty seconds added to his time. Once only in the game the player may demolish the block in front of him but this adds 10 penalty seconds to his time.

Keys used are
'W', 'A' and 'D' to move,
'X' to demolish a block, and
'S' if you're stuck.

The main routines used in the 'Mini-Maze' program are

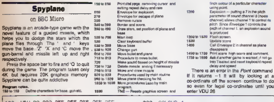
1-60	Initialise variables
100-155	Draw maze
170-215	Test key pressed
240	Test if player has succeeded
300-307	Moves player up if no obstruction
310-317	Moves player left if no obstruction
320-325	Moves player right if no obstruction
330-420	Demolishes block in front of player
340	Zap sound effect
400-420	Explosion sound effect
500-600	End of game routine
610	Calculates time taken
700-794	Instructions
800-819	Given up routine
1000	Produces a randomly pitched beep

```
1 REM****************
2 REM*VIC MINI-MAZE*
3 REM*            *
4 REM*BY HUW EVANS *
5 REM****************
8 H=1000000000000
9 GOSUB700
10 S0=7680:S1=38400:V=36878
   :S6=36876:P=8176:P1=38896
   :F=0:EX=0
50 PRINT"□"
60 POKEV,15
100 FORI=1TO270
110 A=INT(RND(1)*500)
120 POKES0+A,160
130 POKES1+A,A
140 GOSUB1000:NEXT
150 PRINT"▓"
155 POKE7690,42:POKE38410,2
160 FORI=8164TO8185:POKEI,1
   2:NEXT
165 POKEP,65:POKEP1,0:
   POKES6,0
167 T1=TI
170 GETA$:IFA$=""THEN170
180 G=0:IFA$="W"THENG=1
190 IFA$="A"THENG=2
200 IFA$="D"THENG=3
210 IFA$="X"THENG=4
215 IFA$="S"THEN800
220 IFG=0THEN170
230 ONGGOSUB300,310,320,
   330
240 IFPEEK(7690)=65THEN
   GOTO600
299 GOTO170
300 IFPEEK(P-22)=160THEN
   GOSUB400:RETURN
305 POKEP,32:P1=P1-22:
   P=P-22:POKEP1,1
307 POKEP,65:POKEP1,0:
   GOSUB500:RETURN
310 IFPEEK(P-1)=160THEN
   GOSUB400:RETURN
315 POKEP,32:P=P-1:P1=P1-1
317 GOTO307
320 IFPEEK(P+1)=160THEN
   GOSUB400:RETURN
325 POKEP,32:P=P+1:P1=
   P1+1:GOTO307
330 F=F+1:IFF>1THENRETURN
340 EX=EX+5:POKEV,15:
   FORM=180TO235STEP2:
   POKE36876,M:NEXTM:
   POKEP-22,32
350 POKE36876,0
400 POKE36877,220
```

to next page

```
410 FORL=15TO0STEP-1:POKEV,L
420 FORM=1TO100:NEXTM,L:POKE36877,0:POKEV,0:EX=EX+5:RETURN
500 POKEV,15:FORM=1TO20:POKE36876,190:NEXTM:POKE36876,0:POKEV,0:RETURN
600 PRINT"  SUCCESS!!!"
610 T2=TI-T1:T2=INT(T2/60)
620 PRINT" YOU TOOK"T2"SECONDS."
630 PRINT" YOUR PENALTY TIME IS:"EX" SECS.":T=EX+T2
640 PRINT" THEREFORE YOUR TOTAL  TIME IS "T"SECS."
650 IFT<HSTHENHS=T
660 PRINT" HIGH SCORE="HS"SECS."
670 PRINT" ANOTHER GAME"
675 GETB$:IFB$="N"THENPRINT"":END
680 IFB$="Y"THEN10
690 GOTO675
700 PRINT"     VIC MINI-MAZE"
710 PRINT" STEER YOURSELF TO THE STAR AT THE TOP OF THEMHZE."
720 PRINT" CONTROLS ARE:"
730 PRINT"  - UP"
740 PRINT"  - LEFT"
750 PRINT"  - RIGHT"
760 PRINT"    STUCK!"
770 PRINT"  - ZAPS THE BLOCK IN     FRONT OF YOU -CAN     ONLY BE USED ONCE"
780 PRINT"     GIVES 10 PENALTY     PTS.)"
785 PRINT"  FLASHING-5 PEN.PTS.!"
790 PRINT" PRESS ANY KEY TO START":GETB$:IFB$=""THEN790
794 GOTO10
799 END
800 PRINT" ...SO YOU'RE NOT AS "
810 PRINT" CLEVER AS YOU THOUGHT!":GOTO670
999 POKEV,0:END
1000 POKEU,INT(RND(1)*128)+128:FORM=1TO10:NEXTM:RETURN
```

Minimaze
by Huw Evans



Spyplane

on BBC Micro

Spyplane is an arcade-type game with the novel feature of a guided missile, which helps you to dodge the stars which the plane flies through. The ' and ' keys move the base. 'Z' 'X' and 'C' move the gun-barrel and missile left, up and right respectively.

Press the space bar to fire and 'Q' to quit during the game. The program takes only 4K, but requires 20K graphics memory. Spyplane can be quite addictive.

Program notes.

100 to 160	Define characters for base, gun etc.
190 to 250	Print start page, removing cursor, and setting repeat delay and rate
260	Envelope for explosion.
270	Envelope for escape of plane
300	Remove cursor
340 to 380	Border and score.
390 to 490	Draw stars, set position of plane and base
520 to 700	Main loop
520	Clear keyboard buffer
530 to 580	Move base
530 to 630	Change gun
650 to 700	Move bullet and plane
710 to 810	Procedure to move bullet.
720	Make sound based on height of missile
730 to 750	Delete missile, ending if necessary
750 to 810	Move and draw missile
920 to 930	Procedures used by main routine
940 to 1020	Move plane checking for hit.
1030 to 1590	More procedures used by main program.
1600	FNB — Resets graphics screen, and finds colour of a particular character using point.
1300	Explosion — putting a 7 in the pitch parameter of sound channel 0 (noise channel) allows channel 1 to control its pitch. Since *Envelope* 1 controls the pitch of channel 1, an explosion sound is produced
1300 to 1320	Flash screen.
1520	Update score
1460	Call *Envelope* 2 in channel as plane disappears
1490 to 1700	Print score, high score and comment.
1730 to 1890	Ask if another game is wanted, if not go into Teletext and reset keyboard repeat delay and speed

There is an error in the *Point* command. If it returns −1 it will, by looking at a co-ordinate off the screen, continue to do so even for legal co-ordinates until you enter VDU 26

```
100 VDU 23,230,255,255,255,255,255,255,255,0
110 VDU 23,238,255,255,255,255,255,255,255,255
120 VDU 23,227,0,0,0,0,128,64,32,16
130 VDU 23,228,0,0,0,0,24,24,24,24
140 VDU 23,229,0,0,0,0,1,2,4,8
150 VDU 23,231,128,192,224,112,127,255,255,111
160 VDU23,232,0,0,0,224,144,248,254,255
170 HS=50
180 MODE2:VDU23,8202;0;0;0;
190 COLOUR130:CLS
200 COLOUR1
210 PRINT TAB(4,13);STRING$(12,CHR$(233));TAB(4,17);STRING$(12,CHR$(233))
220 COLOUR 4
230 PRINT TAB(6,15);"SPYPLANE"
240 *FX 11,1
245 *FX 12,1
250 D=INKEY(500)
260 ENVELOPE 1,1,100,-1,-1,2,49,49,0,0,0,0,0,0
127,-1,-1,255,126,20
270 ENVELOPE 2,1,100,-1,-1,2,49,49,
280 BULLET=1:HIT=0:SCORE=0:NM=0
290 REPEAT
300 O=21:FI=0:H0=0:PE=0:EN=0
310 MODE1
320 VDU 23,8202;0;0;0;
330 COLOUR1
340 FOR T=0 TO 39:VDU 31,T,0,233,31,T,30,233:NEXT T
```

to next page

from previous page

```
350  COLOUR 2
360  PRINT TAB(1,31)"YOU'VE HIT ",
HIT," SHIPS. YOU SCORE ",SCORE
370  COLOUR 1
380  FOR T=1TO 30:VDU 31,0,T,230,31,
39,T,230:NEXT T
390  NS=RND(10)+15
400  G$=CHR$(228)
410  X=0
420  COLOUR 2
430  REPEAT PRINT TAB(RND(36),
RND(20)+1),"*",
440  X=X+1:UNTILX=NS
450  PH=RND(20)+1:PX=2
460  COLOUR 3
470  PRINT TAB(20,29),CHR$(230),
TAB(21,29),CHR$(230),TAB(22,29),CHR$(230),
480  PROCgun
500  FOR XX=1 TO 2
510  A$=INKEY$(0)
520  *FX 15,1
530  IF A$="" THEN650
540  OB=B
550  IF A$="," AND B>3 THEN B=B-1:
PRINT TAB(B+2,29)" ",
560  IF A$="." AND B<36 THEN B=B+1:
PRINTTAB(B-2,29),' ',
570  IF B=OB THEN 590
580  PRINTTAB(B-1,29),CHR$(230),TAB
(B,29),CHR$(230),TAB(B+1,29),CHR$(230)
590  IF A$="Q" THEN NM=7:UNTIL NM=7:
GOTO 1490
600  IF A$="Z" THEN G$=CHR$(227)
610  IF A$="X" THEN G$=CHR$(228)
620  IF A$="C" THEN G$=CHR$(229)
630  PROCgun
640  IF A$=" " AND FI=0 THEN FI=1:
PB=B:HB=27:B$=G$:BULLET=BULLET+1
650  IF FI=1 THEN PROCbullet:PROCgun:
ELSE PROCdelay
660  NEXT XX
670  IF EN=1 THEN UNTIL NM=7:
GOTO 1490
680  PROCship
690  IF EN=1 THEN UNTIL NM=7:
GOTO 1490
700  GOTO 500
710  DEFPROCbullet
720  SOUND 18,-10,HB,2
730  IF FNS(PB,HB,3,2)=2 THEN
PROCdelete:FI=0:HB=0:ENDPROC
740  IF PB=PX AND HB=PH THEN
PROChit:FI=0:HB=0:ENDPROC
750  PROCdelete
760  HB=HB-1:PB=PB+(ASC(G$)-228)
770  IF FNS(PB,HB,3,2)=2 THEN FI=0:
HB=0:ENDPROC
780  IF FNS(PB,HB,3,2)=3 THEN
PROChit:FI=0:HB=0:ENDPROC
790  IF HB=0 OR PB=1 OR PB=39
THEN FI=0:ENDPROC
800  PROCdraw
810  ENDPROC
820  DEFPROCdraw
830  PRINT TAB(PB,HB);G$
840  ENDPROC
850  DEFPROCdelete
860  PRINT TAB(PB,HB)," ",
870  ENDPROC
880  DEFPROCdelay
890  FOR I=1 TO 100:NEXT I
900  ENDPROC
910  DEFPROCgun
920  PRINT TAB(B-1,28);" ",G$," ",
ENDPROC
930  ENDPROC
940  DEFPROCship
950  IF (PB=PX OR PB=PX-1) AND HB=PH
THEN PROChit:FI=0:HB=0:ENDPROC
960  IF FNS((PX-1),PH,3,2)<>2
THEN PROCdeleteship ELSE PROCstar2
970  IF PX=38 THEN PROClose
980  PX=PX+1
990  IF PB=PX AND PH=HB THEN PROChit:
FI=0:HB=0:ENDPROC
1000  IF FNS(PX,PH,3,2)=2 THEN
PROCpassstar1 ELSE PROCshipfront
1010  IF FNS(PX-1,PH,3,2)=2 THEN
PROCpassstar2 ELSE PROCshipback
1020  ENDPROC
1030  DEFPROCshipfront
1040  PRINT TAB(PX,PH),CHR$(232)
1050  ENDPROC
1060  DEFPROCshipback
1070  IF FNS(PX-2,PH,1,5)=2 THEN
PROCstar2
1080  PRINT TAB(PX-1,PH) CHR$(231)
1090  ENDPROC
1100  DEFPROCdeleteship
1110  PRINT TAB(PX-1,PH)," ";
1120  ENDPROC
1130  DEFPROCstar
1140  COLOUR 2
1150  PRINT TAB(PX,PH),"*"
1160  COLOUR 3
1170  ENDPROC
1180  DEFPROCstar2
1190  COLOUR 2
1200  PRINT TAB(PX-1,PH),"*"
1210  COLOUR 3
1220  ENDPROC
1230  DEFPROCpassstar1
1240  VDU 31,PX,PH,232,18,0,2,5,31,PX,
PH,42,4,18,0,3
1250  ENDPROC
1260  DEFPROCpassstar2
1270  IF FNS(PX-2,PH,0,2)=3 THEN
PROCshipback:ENDPROC
1280  VDU 31,PX-1,PH,231,18,0,2,5,31,
PX-1,PH,42,4,18,0,3
1290  ENDPROC
1300  DEFFNS(X1,Y1,N1,N2):VDU26:A=
```

turn to page 20

from previous page

PROGRAM OF THE WEEK

```
PLOT(X1*C+N1)*4,((31-Y1)*8+N2)*4)
1310 =A
1320 DEFPROChit
1330 PRINT TAB(HB,PB)," ",
1340 PROCshipfront PROCshipback
1350 HIT=HIT+1 SOUND 17,1,1,20
SOUND16,-15,7,20
1360 FOR A=1 TO 16
1370 VDU 19,3,(A MOD 2)*2 0,0 0
1380 VDU 19 2,(A MOD 2)+1,0 0,0
1390 VDU 19,1,(A MOD 2)*5+1,0 0,0
1400 VDU 19,0,ABS(A MOD 2)-2),0,0 0
1410 FOR B=1 TO 20 NEXTB
1420 NEXT A
1430 SCORE=HIT*10-BULLET*2-NM*10
1440 ENDPROC
1450 DEFPROClose
1460 SOUND17,2,10,10
1470 NM=NM+1
1480 GOTO 4
1490 MODE .
1500 IF SCORE HS THEN HS=SCORE
1510 VDU 19,0,4,0 0,0,19 3,2,0,0,0
1520 PRINTTAB(1,1),"Your score - "
SCORE " - "
1530 IF SCORE 0 THEN PRINT"FAILURE"
GOTO 1690
1540 IF SCORE<40 THEN PRINT"AWFUL"
GOTO 1690
1550 IF SCORE.70 THEN PRINT"UTTERLY
DISGRACEFUL" GOTO 1690
1560 IF SCORE<100 THEN PRINT"
APPALLING" GOTO 1690
1570 IF SCORE 140 THEN PRINT"
VERY BAD" GOTO 1690
1580 IF SCORE<190 THEN PRINT"
BAD" GOTO 1690
1590 IF SCORE 220 THEN PRINT"
O.K." GOTO 1690
1600 IF SCORE 250 THEN PRINT"
GOOD GOTO 1690
1610 IF SCORE 300 THEN PRINT
VERY GOOD" GOTO 1690
1620 IF SCORE 350 THEN PRINT
EXCELLENT" GOTO 1690
1630 IF SCORE<400 THEN PRINT
WONDERFUL" GOTO 1690
1640 IF SCORE 500 THEN PRINT"
BRILLIANT" GOTO 1690
1650 IF SCORE<600 THEN PRINT"
BIONIC" GOTO 1690
1660 IF SCORE THEN PRINT
WONDER WOMAN" GOTO 1690
1670 IF SCORE 1000 THEN PRINT"
HYPER SLICK" GOTO 1690
1680 PRINT"CHEAT"
1690 PRINT " You have lost your
secrets to the enemy"
1700 PRINT "...and have been made
redundant by a ""
1710 PRINT "computer Programmer."
1720 VDU 19,2 1 0,0 0
1730 COLOUR
1740 PRINT " The high score is now
",HS,".",
1750 PRINT" Do you wish to try to
regain your job?"
1760 A$=GET$
1770 IF A$="Y" THEN 290 ELSE IF
A$<>"N" THEN 1760 ELSE MODE 7
1780 *FX11,50
1790 *FX12,0
1800 END
```

Spyplane by Colin Stark

Dicethrower

on BBC Micro

Many games involving chance are based on the throwing of dice. All too often the computer version simply generates a random number between 1 and 6 and responds with a rather boring message.

A game programmed in this way misses the thrill of actually seeing the dice land and interpreting their pattern of spots. This routine, which can easily be incorporated into any of your dice-based games, will display the dice in any chosen colour, at the positions you specify.

Your main program needs to call two procedures.

PROCSETUPCHRS, which should be called once only, at the start of the game, consists of a series of VDU 23 calls to define characters, each of which is one quarter of a die face.

PROCDICE is called each time your program wants one die thrown. It sets the resident integer variable A% to a random number between 1 and 6 — your main program will probably want to use this to determine what to do next.

PROCDICE then assembles the four defined characters which make up the randomly determined die face, and prints the face at the position specified in X%, Y%, in the colour specified in colour%.

That's the formal description — but why don't you just try it?

```
10 REM ***DICE-THROWING ROUTINE***
20 REM *  by Nike Berry          *
30 REM ***************************
40 REM
50 REM ***Start of your program***
60 PROCSETUPCHRS
70 MODE1
80 PROCDICE(10,10,3)
90 PROCDICE(13,10,1)
100 END
110 REM ***End  of your  program***
120 DEFPROCDICE(X%,Y%,colour%)
130 COLOUR (colour%)
140 A%=RND(6)
150 ON A% GOTO 160,210,260,310,360,410
160 CH1$=CHR$(232)
170 CH2$=CHR$(238)
180 CH3$=CHR$(239)
190 CH4$=CHR$(233)
200 GOTO450
210 CH1$=CHR$(234)
220 CH2$=CHR$(235)
230 CH3$=CHR$(236)
240 CH4$=CHR$(237)
250 GOTO450
260 CH1$=CHR$(232)
```

to next page

from previous page

```
270 CH2$=CHR$(229)
280 CH3$=CHR$(230)
290 CH4$=CHR$(233)
300 GOTO450
310 CH1$=CHR$(234)
320 CH2$=CHR$(240)
330 CH3$=CHR$(241)
340 CH4$=CHR$(237)
350 GOTO450
360 CH1$=CHR$(228)
370 CH2$=CHR$(229)
380 CH3$=CHR$(230)
390 CH4$=CHR$(231)
400 GOTO450
410 CH1$=CHR$(224)
420 CH2$=CHR$(225)
430 CH3$=CHR$(226)
440 CH4$=CHR$(227)
450 PRINTTAB(X%,Y%),CH1$;CH2$;TAB(X%,Y
%+1),CH3$,CH4$
460 VDU20
470 ENDPROC
480 DEF PROCSETUPCHRS
490 VDU23,224,255,128,152,152,128,128,
128,152
500 VDU23,225,255,1,25,25,1,1,1,25
510 VDU23,226,152,128,128,128,152,152,
128,255
520 VDU23,227,25,1,1,1,25,25,1,255
530 VDU23,228,255,128,152,152,128,128,
128,129
540 VDU23,229,255,1,25,25,1,1,1,129
550 VDU23,230,129,128,128,128,152,152,
128,255
590 VDU23,234,255,128,152,152,128,128,
128,126
600 VDU23,235,255,1,1,1,1,1,1,1
610 VDU23,236,128,128,128,128,128,128,
128,255
620 VDU23,237,1,1,1,1,25,25,1,255
630 VDU23,238,255,1,1,1,1,1,1,129
640 VDU23,239,129,128,128,128,128,128,
128,255
650 VDU23,240,255,1,25,25,1,1,1,1
640 VDU23,241,128,128,128,128,152,152,
128,255
870 ENDPROC
560 VDU23,231,129,1,1,1,25,25,1,255
570 VDU23,232,255,128,128,128,128,128,
128,128
560 VDU23,233,129,1,1,1,1,1,1,255
```

Dicethrower
by Mike Berry

Better than Basic



Can you program in a computer language other than Basic?

Enter this challenging new competition and win a Jupiter Ace.

Basic, for all its advantages, is slow. Programs written in Basic tend to look rather pedestrian when compared to programs written in some other languages such as machine code.
We want something different, something faster than Basic. It could be machine code, Forth, Lisp, Pascal or Fortran. In fact your entry can be written in anything that is not Basic. And the best non-Basic program, be it game, utility or other, will win the Jupiter Ace.

The entries will be judged by *Popular Computing Weekly* editor, Brendon Gore, and Jupiter Ace designers Richard Altwasser and Steve Vickers. In their selection account will be taken both of the standard of the program and of the accompanying documentation. The whole range of languages and types of program are allowed. The only stipulation is that it must not be written in Basic.

Entries to the award scheme must be accompanied by four of the numbered coupons published in *Popular Computing Weekly* throughout October. The closing date for the competition is November 18. The winning entry will be announced in the issue published on December 23.

Rules

1. *There is no limit on the number of entries you can send in, but each entry must be accompanied by four differently numbered competition coupons.*
2. *Closing date for entries is November 18 1982.*
3. *The names of the winners will be announced in the December 23 issue of Popular Computing Weekly.*
4. *The Judges' decision is final.*
5. *No employees of Sunshine Publications Ltd, or their families will be eligible to enter the competition.*

Popular Computing Weekly
Better than Basic Compatition

Fill in this coupon. When you have collected four differently numbered coupons send them with your program to: *Popular Computing Weekly*, Better than Basic, Hobhouse Court, 19 Whitcomb Street, London WC2.

NAME ....

ADDRESS ....

....

....

....

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from page 13

These are the main editing sub-commands but here are just some of the others *L* lists the remainder of the line and returns the cursor to its start *X* incorporates both the *L* and *I* sub-commands *A* cancels any changes so far indicated and returns the cursor to the start of the line *E* ends the editing mode, saves the changes and reinstates the command mode *Q* reinstates the command mode but cancels all the changes made

The Colour Genie is capable of handling up to 128 user-defined characters For each of these the ASCII code is constructed in an 8 × 8 format within eight memory locations The 128 characters are stored in the locations between F400H and F7FFH

Sound on the Colour Genie is a far cry from the subdued *Beep* of the Spectrum It has three voices, each of which can play any of 11 notes (or a rest) in eight octaves at any of 15 volumes. In the latter case the command is unnecessarily subdivided — some of the 15 variations are not easily distinguishable

The sound capabilities are flexible, but their Initiation is somewhat cumbersome Sound is produced by the *Play (C O N V)* command, where *C* is the channel *O* is the octave *N* is the note and *V* is the volume Before the *Play* command can be used the sound routines must be accessed with the command *Sound 7 248* After use they must be terminated using the command *Sound 7 255* The duration of any note has to be determined by a *For Next* loop

Errors on the Colour Genie are signalled with a useful selection of error messages in many microcomputers mistakes are indicated by the unhelpful and all-embracing *Syntax Error* The Genie identifies 23 separate faults with different error codes

Summary

With so many microcomputers selling at around the £200 mark, it is difficult to see any features that make the Colour Genie stand out from the crowd

Twelve months ago the Colour Genie would have been outstanding Now there is the Dragon 32, which offers more or less the same facilities and the Spectrum which is not as flexible but £75 cheaper Other competitors include the BBC Micro and the Lynx which are more expensive but have more potential for expansion

The Colour Genie is a sophisticated machine at a realistic price But it will find it difficult to break into a market dominated by established micros with similar capabilities

In this slot various contributors explore different aspects of the ZX Spectrum

Deus ex machina

***Andrew Pennell** reveals some of the secrets hidden in the Spectrum Rom.*

The 16K Spectrum Rom contains many routines that can be used by the Basic programmer as well as by the adept machine code addict For example it is often useful to find out how long it takes for a key to be pressed This can be achieved by *Peeking* and *Pokeing* the frames variables, as mentioned in chapter 18 of the manual

However it is much easier to use a line such as *Let T = 7997 – Usr 7997* When this line is encountered, the program will wait (for up to 2 mins 40 secs) until a key is pressed T will contain the time taken, in 50ths of a second The ZX81 *Scroll* function can be simply executed by the line *Randomize Usr 3582* Incidentally *Randomize Usr 3213* will ask you 'scroll?' in the usual way, beforehand

When a program ends, the uninteresting message '0 OK 100 1' or a similar uninteresting message appears For a bit of variety, make the last line of your program *Randomize Usr 4757*, and the words '© Sinclair Research Ltd' will appear in the current print position The program will then wait for you to press a key before the usual 'OK appears Alternatively *Randomize Usr 4750* will print it in the same place as it does after a *New*

It is possible to print on the two lower lines by using a statement such as *Print#0*; "message" but beware of unexpected scrolling The addition of *At* 0,0 in *Print* and *Input* statements will help

Although *Inkey$* is useful in reading the keyboard, it can be awkward if any of the shift keys are held down A line such as *Let a$ = Chr$ Peek 23556* will rectify the problem as a$ will contain the upper-case of the current key being pressed, ignoring shift keys or L mode If no keys are pressed, this returns the value *Chr$ 255* If both shift keys are held down this function and *Inkey$* will return the value *Chr$ 14*

After running a colourful program, or breaking into it listings will appear in the current colours This is difficult, if not impossible, to read with certain combinations particularly if the *Paper* colour is the same as the *Ink* colour To return to normal, it is usual to enter the statement *Ink 0 Paper 7 Bright 0 Flash 0* This can be replaced with the much more manageable *Poke 23693 56*

When listing a long program and presented with 'scroll?', press *Shift 3* or *Shift 4* Two screenfuls of listing will scroll by before the next 'scroll?' appears, speeding up the process

Finally, the program in listing 1 alleviates a recurrent problem in published ZX Printer listings of Spectrum programs — that of deciding which characters are user-defined graphics, and which are not It converts each graphic character into its lower-case equivalent, and puts a black border around it When the program has run, the characters should be saved on tape, using the technique on page 147 in the manual The user defined graphics can then be loaded back before a program is *Listed* for submission to this, or any other magazine

Sinclair's ZX Spectrum

Listing 1

```
10 FOR I = 97 TO 117
20 LET A$ = CHR$ I
30 POKE USR A$ 255 POKE USR A$ + 7,255
40 FOR J = 1 TO 6
50 POKE USR A$ + J 128 + PEEK (15360 + 8 * I +
J)
60 NEXT J
70 PRINT CHR$ (47 + I)
80 NEXT I
```

Switch control to your joystick

Peter Wilson explains how to convert Vic20 programs for use with a joystick.

Having bought a joystick for my Vic20 I decided to convert my existing games programs to work using commands from the joystick rather then from the keyboard.

Where the program only requires Up, Down, Left, Right and Fire, the conversion is quite straightforward. The joystick is set up as in the figure below.

Fire button
Switch 4
Switch 0
Switch 2
Switch 3
Switch 1

Switches 0, 1, 2 and 4 are controlled by Data-Direction Register (37139) and Output Register A (37137). Switch 3 is controlled by Data-Direction Register (37154) and Output Register B (37152).

The joystick can be made to control the movement, perfectly, using the following lines.

```
10 POKE 37139,0 : POKE 37154,127   (Sets Data-Direction Registers)
20 U = PEEK (37137)                (Register A)
30 U0 = ((U AND 4) = 0)            (Switch 0)
40 U1 = -((U AND 8) = 0)           (Switch 1)
50 U2 = ((U AND 16) = 0)           (Switch 2)
60 U4 = ((U AND 32) = 0)           (Switch 4)
70 W = PEEK (37152)                (Register B)
80 U3 = -((W AND 128) = 0)         (Switch 3)
90 POKE 37154,255                  (Restores keyboard)
```

If the joystick is not moved all the variables (U0, U1, U2, U3 and U4) will have the value of 0. When the joystick is moved the variable in the direction of the movement will then have the value of 1 or −1. The following lines will then respond to movement.

```
100 IF U0 < > 0 THEN PRINT "UP"
110 IF U1 < > 0 THEN PRINT "DOWN"
120 IF U2 < > 0 THEN PRINT "LEFT"
130 IF U3 < > 0 THEN PRINT "RIGHT"
140 IF U4 < > 0 THEN PRINT "FIRE"
```

All the programs I have converted used the statement *IF A$ = Y THEN Z or IF PEEK (X) = Y THEN Z*.

To convert these lines just substitute any one of the lines from Line 100 to Line 140. For example *IF A$ = Y THEN Z* becomes *IF U3 < > 0 THEN Z*, *IF PEEK (X) = Y THEN Z* becomes *IF U2 < > 0 THEN Z*.

The only difficulty is encountered when wishing to move at an angle. Assigning values to all eight directions and Fire is slow and uses a lot of memory. A better method is to change two switch values when moving at an angle. For example, to move Up and Right set U0 = −1 and U3 = 1.

When all eight directions are needed add the lines

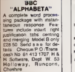
```
150 IF U0 < > 0 AND U2 < > 0 THEN PRINT "UP AND LEFT"
160 IF U0 < > 0 AND U3 < > 0 THEN PRINT "UP AND RIGHT"
170 IF U1 < > 0 AND U2 < > 0 THEN PRINT "DOWN AND LEFT"
180 IF U1 < > 0 AND U3 < > 0 THEN PRINT "DOWN AND RIGHT"
```

These commands can now be used in a simple *Joystick Drawing* program. The program is written for the unexpanded Vic20. It lets you draw shapes or patterns, starting from the middle and then in any of the eight directions of the joystick.

Line 30 sets the block co-ordinates. Line 40 pokes blocks. Line 50 records the position of the last block. Lines 60 to 220 set the joystick and react when the joystick is moved. Line 230: if the fire button is pressed then the screen is cleared and the program starts again. Lines 250 and 270 check that the co-ordinates have not gone off the screen. If this happens the co-ordinates will be reset to the position of the last block. Press the *Run/Stop* key to stop the program.

```
1 REM JOYSTICK DRAWING
5 REM P.E.WILSON
10 POKE36879,25:POKE36869,240
20 CLR:PRINT"J"
30 X=7932:Y=30652:Z=10:V=11
40 POKEX,160:POKEY,0
45 FORW=1TO200:NEXT
50 XX=X:YY=Y:ZZ=Z:VV=V
60 POKE37139,0:POKE37154,127
70 U=PEEK(37137)
80 U0=((UAND4)=0)
90 U1=-((UAND8)=0)
100 U2=((UAND16)=0)
110 U4=((UAND32)=0)
120 U=PEEK(37152)
130 U3=-((UAND128)=0)
140 POKE37154,255
150 IFU0<>0ANDU3<>0THENX=X-21:Y=Y-21:Z=Z+1:V=V-1:GOTO250
160 IFU1<>0ANDU3<>0THENX=X+23:Y=Y+23:Z=Z+1:V=V+1:GOTO250
170 IFU1<>0ANDU2<>0THENX=X+21:Y=Y+21:Z=Z-1:V=V+1:GOTO250
180 IFU0<>0ANDU2<>0THENX=X-23:Y=Y-23:Z=Z-1:V=V-1:GOTO250
190 IFU0<>0THENX=X-22:Y=Y-22:V=V-1:GOTO250
200 IFU1<>0TNENX=X+22:Y=Y+22:V=V+1:GOTO250
210 IFU2<>0THENX=X-1:Y=Y-1:Z=Z-1:GOTO250
220 IFU3<>0THENX=X+1:Y=Y+1:Z=Z+1:GOTO250
230 IFU4<>0TNEN20
240 GOTO60
250 IFZ<0ORZ>21TNENX=XX:Y=YY:Z=ZZ:V=VV
270 IFV<0ORV>22TNENX=XX:Y=YY:Z=ZZ:V=VV
280 GOTO40
```

Classified



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For details of classified advertising rates AND coupon on Page 4

Peek your problems to our address. Ian Beardsmore will poke back an answer.

PACE UP YOUR TROUBLES

Philip Watson, Burnside, East Boldon, Tyne & Wear writes

Q **Like many ZX81 owners I have had a lot of trouble with *Load* and *Save*. I plan to buy a new computer in the near future, and the obvious choice is the Spectrum. However, I am worried about the *Load/Save* commands on it. I might therefore opt for a Vic20 or the new Vic30.**

Has the Spectrum better *Loading* and *Saving* facilities than the ZX81? If not, then I think the Vic will suit me. All the Commodore machines that I have used have been tremendously easy when it comes to *Loading* and *Saving*. Do Commodore tape decks take digital recordings? If so, is this the reason for their success?

A The Spectrum has a built-in schmitt trigger which cuts out a great deal of the extraneous noise that renders so many ZX81 tapes useless. As yet I have come across no *Loading* or *Saving* problems with the Spectrum.

Commodore tapes are recorded digitally, which helps to minimise *Loading* and *Saving* problems.

A DISABLING PROBLEM

Andrew Dunne of Scott Avenue, Baxenden, Lancashire writes

Q **In the Spectrum section of *Popular Computing Weekly*, August 5, Sam Goodwin stated that the *Break* key of the Spectrum could be disabled. I would like to know if this is possible in the ZX81, with any or all the keys. Also I would like to know if it is possible to merge two or more programs on the ZX81?**

A The normal keyboard scan has to be replaced by one written in machine code. This scan will look for a key entry and, on a specific key being pressed, will take action, accordingly. Ensure that, in the machine code program, the *Break* function is ignored. The same principle will work for any key.

Only a certain amount of chaining and merging of programs and data is possible on the ZX81. Barry Cornhill wrote an article dealing with this which appeared in our May 13 and June 3 issues.

AUX ARMES, CITOYENS

Paul Bateson of Guildford Surrey writes

Q **I have a ZX81 and I would like to know if my father could use it in his company. He has about 50 people working for him, many of them doing shifts. I would like a program that makes it easy to keep track of which person is working what hours.**

This program should also keep a record of who has what days off, and who would like to swap shifts. Since the time of a shift affects the workers' pay, this program should ideally be tied in with the work roster.

Each worker has his own code number. But, because there are pay details on the computer as well, would it be possible for some sort of security system to be included?

A I have had several questions of this type. Usually they are so specific as to be of only slight interest to other readers. For this reason I will try and answer the question in general terms.

The first thing to look at is the memory requirements of such a system. You will probably need more than 16K if you are to store all the information on a single tape, so I suggest you look at a 48K or 64K add on.

When considering business software on the ZX81, the first company that comes to mind, is Hilderbay. While they are by no means the only company producing this sort of software for the ZX81, they do concentrate on it. They can be contacted at Hilderbay Ltd, 8-10 Parkway, Regents Park, London NW1 7AA. In their range they have banking, wages, stock control, and budgeting programs available.

Both Saxon Computing, 3 St Catherines Drive, Beverley, Humberside and Bug Byte, 98/100 The Albany, Old Hall Street, Liverpool L39EP offer a database file handling type program. The Bug Byte one includes a security system.

If you want to just store information on shifts then you might well find that the Sinclair (Psion) *Vu-File* or the Video Software *Video View* is what you need. Both cost £7.95 and can store up to 12 pages of information, using a 16K Ram pack. Video Software are at Stone Lane, Kinver, Stourbridge, West Midlands DY7 6EQ.

With regard to security, the obvious precautions are to keep the duty roster and payroll separate and to keep the computer locked-up. Alternatively, use an instruction like *Input* A$ where A$ is a code, followed by *If* A$= (the code) *Then Goto* (the rest of the program). Protection of data is a major problem for computer storage at every level and a security system cannot be properly devised until after the software has been developed.

A CRASHING BORE

Matthew Field of Park Road Kingston upon Thames writes

Q **I own a ZX81. In May I sent my computer back to Sinclair because it kept crashing. Now, almost every time I switch on my ZX81, I get a white band about two inches wide that moves up and down the screen. My television also seems to lose the horizontal hold. I do not want to send my ZX81 back to Sinclair, because I would then be 'computerless' once more.**

A I can understand your reluctance about returning your ZX81 again.

It is common for the television to need slight re-tuning before you use your computer, even if the channel selector is exactly where it was when you used it previously. So the first thing to try is slightly re-tuning your television. Next try your computer on a different television — it could be that it is the television that is faulty.

The white line sounds as though the problem may be overheating. Does your computer get very hot? This alone is unlikely to be the cause if you get the problem right from the power up. If you are still having problems after checking the tuning and televisioon then you will have to face up to the prospect of sending your computer back.

REGISTERING AT COMPANIES HOUSE

R Bayliss of Links Drive, Solihull, West Midlands writes

Q **I have been thinking about setting up a company to produce my own software. I have heard that you can send off and register a company for under £2. If so, could you please give me the address that I must write to. If this is not correct, could you give me any information about starting a company.**

A You are thinking of the old-style '£1 company' set up with the minimum holding of two £1 shares. The new PLC rules covering limited and unlimited companies make it even easier to set up an unlimited company.

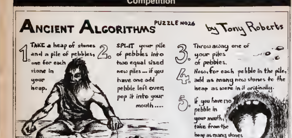
All you need is a certificate which gives your name, your trading name and your line of business. This must be displayed at your place of operation. In effect, you only need to type up the details and hang them on the wall. You need to notify your bank when you open your company account and they will list you as R Bayliss T/A (Trading as) then your company name. You can no longer register the name of an unlimited company.

A limited company will cost about £100 to set up. A limited company is registered at Companies House, which entails various fees.

The first thing to do is write to Companies House, which now has its main base in Swansea and ask for a company registration form. The minimum requirements are that each share should be at least a pound, and that there should be at least £1000 worth of shares available. Of these at least one must be held by each of two nominated company executives, though of course you can have more executives, more shares, and higher value shares.

You can either go through the various stages using a Companies sealing agent who will organise the registration or you can buy a ready made company. This latter choice would be quicker and cheaper.

NB In an unlimited company you are liable for all your company's debts.



Solution to Puzzle No 22

This is Newton's $\sqrt{\ }$ algorithm. It calculates the square root of the number of stones (accurate only to the nearest whole stone of course) in the original heap.

An equivalent Basic program would be

```
10 INPUT H  H = H - 1  L = 1
20 P   INT(H/L)
30 L = L + P
40 L = INT(0.5 + L/2)
50 IF L = C THEN PRINT L  STOP ELSE C = L
   GOTO 20
```

Winner of Puzzle No 22

The winner is Ray Reeves, Longford Avenue, Southall, Middlesex, who receives £10. He adds: the usual expression is Let $S(I + 1) = (S(I) + N/S(I))/2$ where N is the number whose square root is required. $S(I)$ is initially 1 and is replaced by the value $S(I + 1)$ for the next iteration. The method was useful on the early hand-held calculators before they were fitted with a square-root key. The method will produce as accurate an answer as you wish, depending on how far you go. A good guess for $S(I)$ as an initial value will shorten the working considerably.

Rules

The winner of the puzzle will be the reader who in the opinion of *Popular Computing Weekly* has submitted the best solution. Preference will be given to solutions which show how the entrant arrived at the correct answer. Envelopes containing entries should be clearly marked 'PUZZLE'. The closing date is Tuesday October 19. The judge's decision is final.

ARTHUR'S REPLY

A.R.T.H.U.R.

Laurence Lerner & James Macdonald

HE OFFERS TO TAKE OVER EVOLUTION

THEY CALL IT NATURE. IT'S JUST NUMBERS REALLY
YOU NEED A MILLION CHANCES
YOU NEED A MILLION CHANCES
I KNOW THE ODDS   I'M NOT AFRAID OF NUMBERS
THEY TURN ME ON   YOU NEED A MILLION CHANCES
YOU NEED A MILLION CHANCES
YOU NEED A MILLION CHANGES
IF THEY WOULD LET ME TRY, I'D CRUNCH THOSE NUMBERS
IN MICROSECONDS. I KNOW FOR ONE IMPROVEMENT
YOU NEED A MILLION MUTATIONS
MUTATIONS
MUTATIONS
PUTATIONS
YOU NEED PUTATIVE CHANGES FOR IMPROVEMENT
LET ME PUTATE   I'LL DO AS WELL AS NATURE.

SUPPOSE YOU HAVEN'T GOT A MILLION YEARS
YOU CAN USE ME. YOU PROGRAMME WHAT I DO
WE CAN HAVE ALL HAIR RED OR ALL EYES BLUE.
WE CAN HAVE EXTRA LIMBS, TWO HEADS, FIVE EARS,
WE CAN HAVE THREE FOOT WOMEN, TEN FOOT MEN,
NINE YEARS GESTATION. CAN ABOLISH BIRTH
SICKNESS OR DEATH - WELL, SICKNESS IF NOT DEATH
WE CAN TRY ANYTHING. JUST TURN ME ON,
FEED ME THE FACTS, AND WAIT FOR TRIAL AND TERROR.





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'Whether your interests lie in business educational scientific control or games applications this system provides a possibility for expansion which is unparalleled in any other machine available at present, comments Paul Beverley in the July 1982 edition of *Personal Computer World*

The BBC Microcomputer can genuinely claim to satisfy the needs of novice and expert alike It is a fast powerful system generating high resolution colour graphics and which can synthesise music and speech The keyboard uses a conventional layout and electric typewriter feel

You can connect directly* to cassette recorder domestic television video monitor disc drives printers (dot matrix and daisy wheel) and paddles Interfaces include RS423 inter-operable with RS232C equipment and Centronics There is an 8-bit user port and 1MHz buffered extension bus for a direct link to Prestel and Teletext adaptors and many other expansion units The Econet system allows numerous machines to share the use of expensive disc drives and printers

BASIC is used but plug in ROM options will allow instant access to other high level languages (including Pascal, FORTH and LISP) and to word processing software

A feature of the BBC Microcomputer which has attracted widespread interest is the Tube a design registered by Acorn Computers The Tube is unique to the BBC Microcomputer and greatly enhances the expandability of the system by providing via a high speed data channel for the addition of a second processor A 3MHz 6502 with 64K of RAM will double processing speed a Z80 extension will make it fully CP/M** compatible

The BBC Microcomputer is also at the heart of a massive computer education programme The government has recommended it for use in both primary and secondary schools The BBC Computer Literacy Project includes two series of television programmes on the use and applications of computers

There are two versions of the computer. Model A at £299 offers 16K of RAM and Model B at £399 has 32K of RAM

For technical specification and order form, send stamped addressed envelope to P O Box 7 London W3 6XJ and for details of your nearest stockist ring 01-200 0200

Broader horizons

The BBC Microcomputer System

*Model A has a limited range of interfaces but can be upgraded to meet Model B specification.
**CP/M is a registered trade mark of Digital Research.

The BBC Microcomputer is designed, produced and distributed in the UK by Acorn Computers Limited